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THE OLEATES.

FURTHER INVESTIGATION INTO THEIR
NATURE AND ACTION.

INTRODUCTION TO A DISCUSSION IN THE SECTION OF PHARMA-
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BY

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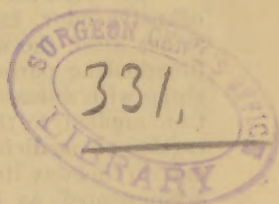
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THE OLEATES.

FURTHER INVESTIGATIONS INTO THEIR NATURE AND ACTION.

THE use of fatty vehicles for applying medicinal substances to the cutaneous envelopment of the body, for the purpose either of producing a local effect, or with a view of making a constitutional impression, is probably as old as medicine itself, and there is no doubt that inunctions played a most important part in the early history of medicine. The fatty bodies then used were the oils expressed from the seeds and fruits of plants, as well as the fats of animals, both domestic and wild, to each of which different actions were attributed. It is not beyond the remembrance of the older members of our profession when dog's fat, snake-oil, bear's oil, though not dissimilar in nature, or only so in an unimportant modification, had the most varied and often absurd therapeutic actions claimed for them.

As in many other ways and instances chemistry came to the succor of our benighted science, and showed for fats and oils generally a similar constitution, depending on the presence of basic and acid radicals; the latter being present in various modifications, while the former, a propenyl or glyceryl, is generally found as a constant component.

When Chevreul, in 1811, proclaimed the chemistry of the fats and oils, and isolated the fatty acids from their bases, the first step in the direction of a more thorough understanding of their nature and action had been taken. For the fatty acids, it was found, especially the one termed oleic acid, could be united to other bases as well as the one that they were originally associated with. This is undoubtedly the first comprehensive knowledge we have of a class of remedial substances which forms the subject of my paper, and which are known as oleates. While, as such, they had been in use for ages previous to this period, they had been applied empirically only, without a knowledge of their constitution. Thus, we had lead-plaster, soaps, etc., but they were only known as such, and not as salts, or combinations of a fatty acid with metallic or alkaline bases, which stamped them respectively as lead oleopalmitates and sodium or potassium oleopalmitates or stearates. Their medicinal application in various ways, by using oleic acid as a solvent for alkaloidal substances, was subsequently agitated by Professor Atfield in 1862, and a paper on their use in medicine by Mr. John Marshall, in 1872, brought them prominently to the attention of the medical profession. His interesting communication and suggestions soon occupied the profession at large, and chemists were busily employed to further perfect both the acid and its products. It was about this time that Dr. L. Wolff, a well-known chemist of Philadelphia, was experimenting in oleic acid and its derivatives, and interested me in his investigations, which from that time we jointly pursued together.

The oleic acid at that period was an unsightly, dark, rancid body of very offensive odor, known to the trade as the red oil of the candle-makers, the refuse after the separation of most of the stearic acid, which is utilized for illuminating purposes. It represented a complex of oxyoleic acid, stearic acid, along with numerous volatile fatty products; and if, either alone or in combination, applied to the skin, it proved an irritant rather than a mild vehicle and carrier of medicinal substances. Purification of this acid availed very little, and to this day its use, though advocated by mercenary manufacturers, is often accompanied, as I shall point out hereafter, with frequently unpleasant and injurious results.

As the oleates, as then known, were at best only oleic solutions, or solutions of some oleate in a large excess of such oleic acid, the disappointments and disadvantages they produced were calculated to seriously interfere with the successful introduction of them as remedies. While oleic acid sufficiently pure to overcome these objections could be had, and was produced by Dr. Wolff for me, the price, in consequence upon the manner of its production at that time, was such that it precluded its extensive use in hospital or general practice; our principal object, then, was first to produce an acid sufficiently pure, while at the same time within the reach of those of ordinary means.

These oleates are the remedies of which I spoke in my paper presented to the Pennsylvania State Medical Society in 1879, and the use of which I advocated at that time, and suggested as subjects of importance for further investigation and improvement.

Impressed with the many defects, disadvantages, and the instability of the old oleates, we worked towards the end of getting oleates that were what their name implied, that would remain stable, and therefore could be relied on for their action. To accomplish this, it was first of all necessary to have oleic acid both by name as by nature, and next to combine it fully; that is, saturate it with the base to be used, and produce neutral and chemical oleates having neither base nor acid in excess. This we effected as already described in my paper presented to the Pennsylvania Medical Society in 1882, by first using the pure oleic acid in making a sodium oleate as the source for all the other oleates.

Sodium Oleate.—Though perhaps one of the oldest if not the oldest oleate known, does not occur in a pure state in commerce; the substance representing it being known as the soaps of the market. That the sodium therein is combined not alone with oleic acid, but also palmitic, stearic, and other acids, making it an oleopalmitate or oleostearate, or both, is well known; besides, that in the process of saponification a great deal of the oleic acid is changed into oxyoleic acid. Pure sodium oleate presents a diaphanous, almost colorless, body, readily soluble in warm and only slowly soluble in cold water. A solution of this in eight parts of water is what we shall term hereafter our sodium oleate solution, by means of which all oleates are to be made. The manufacture of oleates from the foregoing solution is very simple and easily accomplished. A neutral solution of a salt, the substance to be derived as oleate, is added to the sodium oleate solution, until the latter is completely decomposed. As many of the salts of the alkaloids are not readily soluble in water, their solution is accomplished by the addition of a slight excess of their acids, which, upon being filtered, are added to a warm solution of sodium oleate. The amount of the salts thus used is to be noted, and the corresponding amount of their alkaloid computed from their molecular weights, along with the necessary amount of oleic acid necessary for complete saturation. The separated oleate, deprived of its water, is then weighed, and the result in excess of the computed oleate is set down as free oleic acid. As the oleates of these preparations are at present principally used as acid solutions (a method which I do not recommend however), sufficient oleic acid is added to bring it up to the requisite percentage, the true alkaloidal oleate serving as a base therefor.

PHYSIOLOGICAL ACTION OF THE OLEATES.—With a view of determining whether the oleates were absorbed into the blood when applied to the skin, and produced systemic effects, the following experiments were made by us at the well-equipped physiological laboratory of the Jefferson Medical College, aided by Dr. Brubaker, the demonstrator of physiology of that institution. In all instances, the observations were made upon rabbits, and were conducted in the same way. After being properly secured on a Czermak's holder, the hair was carefully removed from the abdomen, so as to present as clean a surface as possible for the action of the drug. The animals were then placed in a large glass jar, so that the excretion might be collected and examined chemically to determine whether the drug had been absorbed.

Quinine Oleate (25 per cent.).—One ounce was thoroughly rubbed over the abdomen for a period of five minutes. At the end of twenty-four hours the urine was carefully examined, but no trace of quinine could be detected. In all other respects the animal was in a normal condition. In the second rabbit, two drachms of the same were injected into the abdominal cavity. At the end of six hours no apparent effect had been produced, at eighteen hours the rabbit was dead. *Post-mortem* examination showed evidences of irritation and congestion of the peritoneal membrane, while the coagulated oil was found over the viscera and in the peritoneal cavity. In this case no quinine was discernible in the urine.

Mercuric Oleate was next experimented with in the same way. Two drachms were applied over the skin of the abdomen. At the end of twenty-four hours the feces had lost their hard character and had become soft and of a yellowish-brown color. The feces and urine were both examined, but no mercury could be obtained. (The change in the consistency of the feces might have been due to the rubbing of the abdomen.) The animal exhibited no other evidence of the action of mercury.

Copper Oleate was next applied. Two drachms softened with oleic acid were rubbed upon the abdomen thoroughly. The subject remained in an apparently normal condition; twenty-four hours after the application the urine did not contain a trace of copper.

Zinc Oleate ($\frac{1}{2}$ ounce) was applied in an exactly similar manner. At the end of twenty-four hours the rabbit was decidedly stupid, and almost helpless as regards motion. Upon killing it with ether, and then opening the abdomen, a thick layer of gelatinous material was found just beneath the skin. The bloodvessels of the skin were enlarged. The irritability of the nerves and muscles remained normal, as shown by stimulation with electricity. The urine which was drawn from the bladder contained no zinc.

Strychnine Oleate (two drachms, containing $2\frac{1}{2}$ grains of strychnia) was rubbed along the groin and inner surface of the thigh for five minutes, no effect had been observed during forty-eight hours, after thoroughly applying the oleate to the abdominal walls.

Aconitine Oleate was applied in a similar manner. Two drachms, containing $2\frac{1}{2}$ grains of aconitine, were rubbed along the groin and the inner surface of the thigh for five minutes. At the end of twenty-four hours no effect had been observed. The animal was in a normal condition.

It would appear from the foregoing experiments that the supposition that oleates were directly absorbed, and taken up by the lymphatics and conveyed into the blood is entirely erroneous, and that the oleates at no time can penetrate deeper than the epiderm and the continuation thereof into the glands and follicles. Here consists, in fact, the advantage that oleates have over ordinary ointments, in that they can enter into the minute openings of the glands and follicles, on account of being dissolved in the fatty base and vehicle; whereas in the ordinary ointment, no matter how minutely subdivided, medicating agents would be prevented from entering into them. The fatty vehicle alone enters, being filtered

off. All the suppositions and hypotheses, setting forth how the oleates were absorbed and enter into the blood at once, are fallacious, and have not been proven by practical results, the most powerful of them scarcely showing any of their physiological effects. By what physiological process or manner the advocates of such theories would demonstrate their hobby is to us unaccountable; and when a prominent writer claims that on brushing oleic acid or oleates lightly over the epidermic surface it disappears with an astonishing rapidity, equalling that of some evaporant, one can only account for it by supposing he had been endowed with extraordinary powers of observation, or he had made his statements without observation, and on the most favorable basis of his expectations. While there is plenty of room and use for the oleates, the worst that can be done by their friends or advocates is to claim for them what they do not, nor cannot, possess. The principal advantage of the oleates is their solubility in the fatty vehicles, by which they are enabled to penetrate, not through the skin and the walls of the vessels, as might be inferred from the writings of some authors, but into the natural openings of the skin, into the glands and follicles; there they may by osmosis be interchanged with some of the systemic fluids, and be absorbed to a certain extent, but physiological experiments seem to make even this most unlikely. The only instance in which this may be the case is with the mercurous oleate, which is so loosely attached to its fatty radical as to easily give it up in exchange for other acids, forming salts with them which are more readily absorbed and assimilated, producing the characteristic effects and symptoms of the drug. Mercuric oleate, on the contrary, while easily by its own constitution is decomposed into mercurous oleate, does not in itself so readily exchange its acid radical for another of the sudorific excretion. That oxide of zinc is not carried into the follicle is quite as well understood as that white or red precipitate should or could not do so. Take the ointment of either of them and melt it, and then place it on filtering paper, and you will readily see the unguent base permeating the porous tissue while the suspended substance is retained on its folds. Dissolve an oleate in any of the fatty vehicles, and you will find that it passes through the porous substance undecomposed and in its entirety, and is thus able to act in the follicle and gland both by action on the near-lying cutis as well as by the possibility of an osmotic process. In this, and this alone, consists the advantage of the oleates—and a material advantage it is. Thus while the ointments of white and red precipitate will destroy the conidia and mycelium of superficial fungi in trycophytosis, chromophytosis, etc., the mercury and copper oleates alone can dip into the follicles and there exert a like destructive action. It might be said that if their principal value consisted in their solubility, as much could be accomplished by watery solutions applied to the surface, but such is not the case. Water or aqueous solutions have a tendency to swell up the epiderm, and by doing so completely occlude the orifices of glands and follicles; while fats, or oils and fatty acids, as well as their derivatives, exert the opposite effect, and are for that reason enabled to enter into those structures.

THERAPEUTIC EFFECT OF THE OLEATES.—Before entering in detail on the medicinal action of the individual oleates, I would dwell on the proper method of preparing them for use. There has been some misconception as to their nature, from the fact that one or two of them can be used to great advantage in their pulverulent state, owing to their mechanical action, besides the chemical influence they exercise, not on the unbroken surface, but on denuded and pathologically affected skin. Thus we find that the zinc oleate, in its powdered state, is a very excellent agent, on account of its property to relieve friction, and, at the same time, contracting the congested and tumified integument.

Again, we see in the application of the powdered silver oleate to denuded

and ulcerating surfaces a most useful measure to coagulate the albumen locally, and forming protective coverings over them. In an attempt, however, to extend the use of powders to the other oleates, we simply lose sight of the one great advantage that is of such importance with this class of preparations, their solubility in vehicles which can penetrate into the depressions of the epidermic covering. That some of the oleates occur in powder form, and some as plasters, and others as ointments, is part of their physical condition which the chemist, by admixtures, should not try to pervert. Their principal use must always be as ointments; and it is, therefore, that I would speak here of them and their proper preparations. While I omit here the proportions to be used, to which I will refer under their respective headings, I can say that, as a general rule, the ointments should be made by melting with the fatty substance intended for their bases, at as low a temperature as possible, to effect solution, which is, as a rule, best accomplished by a water-bath, in which the vehicle is first melted, and then the oleate introduced and stirred therewith until completely dissolved. This is done without much trouble and difficulty by any one, either physician or chemist, and holds good for all save the ointment of the silver oleate, for the preparation of which more specific directions are given hereafter. The fatty vehicles intended for ointment bases are a matter of choice, according to the indications of the case. While, no doubt, the most elegant preparations can be made with the petroleum fats as bases, they form, in my opinion, and in that of others, the least desirable substances for such use. I have already stated in my paper to the Medical Society of the State of Pennsylvania, above cited, that I considered the petroleum products as objectionable for such purposes. I consider them, too, to possess feeble powers of penetrating, if any at all, than animal fats, which have more affinity for the integument. They always contain some stimulating constituent left after their manufacture, which prevents them from having an emollient action; a great source of hindrance to their use as external remedies if you desire to soothe and allay active inflammation. Irritant ointments of veratrine and other like substances which I had made of, respectively, paraffinates and simple ointments, proved, in the former, almost inert, while the activity of that made with simple ointment very soon became evident. I am confirmed in my opinion by Dr. Herman Hager, who, in his celebrated work on *Pharmaceutical Practice*, states that the use of vaseline (or cosmoline, or whatever their pseudonyms may be) in place of lard, or an ointment in such mixtures as contain a remedial agent intended for absorption by the skin, is much to be discouraged, as vaseline (cosmoline, etc.) prevents the absorption thereof.

Although this has been disputed by some, who, however, constitute no medical authority, having commercial interest only in the sale of that class of goods, and for pharmaceutical reasons lay more stress on their handsome appearance than their utility, I think this matter should rest with the physician to decide, rather than the biased vendor.

All of the oleates, if desired in a very concentrated form, can be rendered thin and pliable by the addition to them of a small quantity of oleic acid, which, if warmed and melted with them, readily renders their consistence fit for the purpose of inunction. As a diluent, when either the oleate itself or its oleic dilution would make them too powerful, I know of nothing better than good fresh lard or ointments thereof; under no circumstance, however, should ointments of the oleates be prepared by simply rubbing them up with the diluent, nor should any of them be accepted by the physician which are not perfectly homogeneous.

The advantages of these ointments may be set forth as being economical, as they need be used in small quantities only; and, if properly applied and well rubbed into the dry skin, there will be very little adherent to the surface that

can be rubbed off or soil the clothing, which is a very desirable property. If, however, they are used, as was evidently done by some who raised objections to them on this point, by daubing them on in immense quantities, on the principle that if a little does well more will do better, they may fail both to accomplish the purpose they are intended for, and will exert their influence besides on the patient's clothing alone. They evidently forget the anatomy of the integument, and imagine the minute glands, as follicles, to possess the capacity of much larger organs. Where, for reasons of contact and surface action, the ointment has to be applied copiously, as in the instance of the iron oleate ointment to arsenical ulcers, the ointment has to be secured there by protective measures, both to prevent soiling of clothing, as well as to insure its continued action on the parts affected.

Aconitine Oleate had been lauded for its rapid constitutional effect, which the writer has failed to observe, even after a number of years of careful experimentations with it. It has a slight local action; the effect is, however, very feeble, but can be used in mild cases of neuralgia, for its weak anæsthetic impression on the parts.

Atropine Oleate has a weak action upon the integument, the toxic effect of the drug being almost impossible, except it is applied in a great quantity over a very large surface.

Aluminium Oleate, melted with an equal proportion of lard or some fatty substance, represents the ointment of aluminium oleate. The aluminium oleate ointment coagulates the albumen of the parts to which it is applied, constricts the vessels, checks and corrects all secretion, and has marked styptic as well as antiseptic action. It has a most decided astringent action, and is particularly serviceable in checking muco-purulent discharges that occur in dermititis and in eczema. It can be applied with advantage over the flexor surfaces, and upon those parts that have an excessive discharge from friction, or apposition of two portions of integument. It is particularly well adapted to cases in which the axilla, groin, and buttocks of infants and children become involved, its application often rapidly checking the profuse secretion, and restoring the integument to a normal, healthy condition. In hyperidrosis it lessens and often removes the excessive secretion; while, in bromidrosis, the fetid discharge will either be entirely overcome by its use, or very much diminished in its activity. It is both beneficial and useful, employed as a dressing to foul ulcers, abscesses, sinuses, chilblains, and burns.

Arsenicum Oleate, melted in the proportion of one part of the former with nine parts of lard as an unguent base, or one part in four, according to the strength desired, forms the ointment of arsenic oleate. It is both a valuable alterative and escharotic, but should always be used with caution. Applied to the skin in the natural state, little or no change is produced; but when used moderately strong on abrasions, wounds, ulcerating and granulating surfaces, it acts as an escharotic, exciting active inflammation, and destroying the tissue of the parts to some depth. On the other hand, it will have a most excellent alterative impression on the integument in the form of a very weak ointment. In ulcerating epithelioma, it is one of the very best remedies, by reason of its being better borne for a longer period on the parts than any other form of arsenic. In lupus, it is especially serviceable, destroying by its constant application cell-infiltration in a comparatively mild and painless manner. In the erythematous and tubercular forms of lupus, the parts, however, should be thoroughly scraped, in order to bring the oleate in contact with the abraded surface. In old ulcers, especially those of a scrofulous nature, the arsenic oleate ointment is of great utility. It is likewise of great value as an alterative in the form of a weak ointment, either alone or combined with other remedies, in chronic sycosis, seborrhœa, and in some of the chronic varieties of eczema. It can be employed,

after scraping or puncturing the surface, to destroy warts, corns, horns, condylomata, old granulations, and naevi. It can be combined with such preparations as opium, belladonna, hyoscyamus, arnica, arrowroot, naphthol, etc., to either lessen its activity or to enhance its effect by the additional impression of one or more of these remedies.

Bismuth Oleate.—The ointment of bismuth oleate, a pearly gray, soft bland substance, possesses an emollient and slightly astringent action, and is useful in soothing and relieving cutaneous irritation. It is a most valuable remedy in all pustular eruptions, lightly penciled over the surface. In sycosis, it relieves the engorgement of the parts, often aborts the pustules, and will lessen or remove the itching and pricking that annoys and wears out the patient. It soothes and often overcomes the high inflammation in erysipelas and sunburn. In acne and rosacea, it soothes the hyperæmic skin, relieves the engorgement of the glands, often subduing some of the most intractable cases, and bringing to them ease and comfort from their prolonged suffering. In some of the more obstinate forms of acne and rosacea, however, I always deplete the parts thoroughly first, by puncturing with a needle-knife, after which I pencil the ointment of bismuth oleate over the surface.

It is not only an important, but also a most useful remedy in the treatment of the different varieties of acute eczema, soothing and arresting rapidly the irritated integument. It is often a most effective agent for cracked and sore nipples, used either alone or in combination with opium and belladonna, and arnica, the dry and excoriated condition of the parts giving way on its application.

Cadmium Oleate.—The ointment of cadmium oleate has had as yet but little practical use. It is a very strong stimulant, having almost a caustic action upon the denuded integument; resembling, in this respect, very much the action of the ointment of nickel oleate. It has been used with some advantage in enlarged glands, especially in scrofulous subjects, stimulating to renewed activity the dormant absorbents, and thus removing the abnormal condition from the tissue. It has also been serviceable at times in cases of chronic eczema, with great infiltration, in exuberant granulations, and in old ulcers.

Copper Oleate, melted with either four or nine parts of fat or lard, gives respectively a twenty or ten per cent. of the ointment of copper oleate. Applied in this form to the unbroken skin, it has no visible effect on the surface, but penetrates deeply into the follicles, causing slight stimulation. If brought in contact with the broken skin, it has both an astringent and stimulating effect; an insoluble albuminate is formed which coats over the surface, thus supplying the place of the abraded skin. It condenses the tissues, constricts the blood-vessels, and thus lessens the determination of the blood to the part. It acts as an irritant to any delicate surface, causing inflammation and pain. It is a most effective application to arrest bleeding, particularly in irritable sores; indolent ulcers and obstinate granulations will often yield to the ointment of the copper oleate after resisting the usual applications. It is a most excellent antiseptic, as well as an antiparasitic agent. The most successful results, however, have followed its use upon vegetable parasitic affections, both in my own experience and in that of Sawyer, of England, Fricke, Blackwood, Snowden, O'Hara, Fenton, McClellan, Prall, Herr, Weir, Rosenthal, Means, and many others in America. My attention was directed to the curative action of the ointment of copper oleate in a parasitic affection, in the following manner, which has already been described in my former paper referred to, and from which I quote.

"For several years I have had patients tell me at the hospital, and in my private practice, that they cured this or that member of the family of ringworm by putting an old copper penny in vinegar, and applying the liquid to the patches. Some, however, resisted this treatment, and members of the latter class were usually brought to me with the statement that they had cured other children by

the copper penny in vinegar, how was it that it did not do this case any good? Judging that while this coppery liquid might destroy the fungus on the surface, if the parasite after a time passed into the follicles at its lowest depth, and invaded the hair-bulbs, it could not affect it in any way, I therefore reasoned that, if the copper solution had the power to kill the parasite on the surface, why could it not do the same within the follicles, provided it could be carried there? Remembering the great penetrating action of oleic acid, I had it combined with copper and mixed with a fatty base, and applied on an inveterate and extensive case of ringworm on the scalp of a child that had been treated by numerous remedies in vain, and, in six weeks, the case was completely cured. Other cases, both of ringworm on the scalp and body, were tried with equally good results."

In *tinia vesicolor*, or *chromophytosis*, it acts in a most decided manner, removing rapidly the parasite from the surface, as well as that which has penetrated deep into the follicle. The red, yellowish, and often dark-brown desquamating spots will clear up generally quicker and better from the applications of the ointment of copper oleate than by the use of any other remedy. It is equally effective in *favus*, which also yields quickly to its application. In all vegetable parasitic affections to which it is applied, care should be taken to avoid the too frequent use of water to the parts, which may prevent the copper oleate from penetrating to the lowest depth of the follicle, and thus interfere with its action on the fungus. In fact I always at the present time continue the application of the oleate alone, until all evidence of the fungus has disappeared, interdicting water entirely during the treatment, which I believe assists in nourishing the parasite, and makes it more active. In case it becomes necessary to clean the parts, the use of oleic acid, alcohol, or ether, will fully accomplish the purpose.

It is also unnecessary, in using the ointment of copper oleate in parasitic affections, to epilate or pluck out the diseased hairs, as the deep and effective action of the remedy will alone complete a cure, without following the old routine plan, which I have for some time entirely abandoned as painful and unnecessary. Copper oleate, melted and spread as plaster, will relieve, and very often cure, hard and horny warts, corns, bunions, and thickened conditions of the epidermis, to which it is applied. The ointment of copper oleate is often a most effective remedy for freckles, and other yellowish brown or blackish patches of the skin.

Iron Oleate is readily soluble in fats. Experiments with this oleate, mixed with the various fats, and given internally, have not brought about any good results. The use of the ointment of iron oleate by the inunction method has a very feeble constitutional effect, as with all oleates, for the reasons that have already been cited under their physiological action. It was thought by the writer, after some clinical experiments, which were presented in a former paper, in which the inunction of iron oleate proved of service in anæmic and scrofulous cases, that it would be an invaluable remedy if used in this way; but subsequent and more extended experience has shown its action on the system, in the majority of cases, to be very weak and of little value. The action of iron oleate, like all the other metals and alkaloids of the oleates, is mainly upon the parts to which it is applied. The ointment of iron oleate is a valuable styptic and astringent. In the inflammatory form of eczema, in which the surface has become denuded, red, raw, and bleeding, the application of a weak ointment of iron oleate, or the oleate itself, used in other soothing and slightly astringent combinations, for the same trouble, will prove of the greatest value, its styptic and astringent action having the most happy effect upon the parts. It has a marked effect used in pustular eczema, syçosis, furuncles, and in scrofulous ulcers and sinuses. The iron oleate, mixed with oil of ergot or any of the ordinary oils, can be used with advantage in dry seborrhœa, and in certain forms of alopecia that result from an irritable condition of the glands of the parts. The first and second

stages of acne rosacea are vastly benefited, and often entirely relieved, by the application of a weak ointment of iron oleate. The lesions that result from arsenical poisoning, especially the pustules and ulcers, are more amenable to the action of the ointment of iron oleate than any other remedy that I have used in such conditions. A number of cases of arsenical poisoning have come under my observation, particularly in workmen in several large chemical establishments, and in all cases the pustules and deep and angry ulcers that were present, and upon which many other remedies had failed, rapidly yielded to the application of the ointment of iron oleate.

Lead Oleate, melted with equal parts of lard or lard-oil, or a mixture of the two, according to the season, to present it in ointment form, gives a cream-colored semi-solid ointment of the consistence of simple cerate. It is more easily and cheaply prepared than either Goulard's cerate or Hebra's litharge ointment, or any of the later modifications, and is also more readily absorbed, and superior to all of them.

Umma, and many other physicians who have tested the action of the ointment of lead oleate, report most excellent results from its use.

The ointment is applied to the denuded skin, has both an astringent and sedative action, arresting by this effect morbid discharges, and allaying irritation. It allays very effectually the intense irritation that is often present in papular eczema, and in those forms of the same disease that appear in the flexures of the joints, around the axillae, the inner parts of the thighs and perineum. Pustular eczema of young infants, that is so annoying to the little sufferers, is often benefited, or the inflammation, discharge, and itching entirely checked, by the free application of the ointment of lead oleate. It is equally beneficial in fissured eczema of the palmar and plantar surfaces. If the inflammation and cracking, however, be severe and deep, and require a certain amount of stimulation, the addition of naphthol, oil of camomile, or oil of cade, will increase very much the curative action on the parts. The ointment of lead oleate is a most useful remedy in hard and indurated papules; in acne about the face, neck, and back, and in rosacea. Thymol, carbolic acid, naphthol, and many other stimulating or soothing agents, can often be combined with advantage to the ointment of lead oleate.

Mercuric Oleate.—The ointment of mercuric oleate is a yellowish chemical combination, having a fatty smell, and being of an unctuous consistence. It has a stimulating resolvent and an alterative impression, used on the integument, especially upon tumors, glandular enlargements, indurations, and thickening of the skin. In some of the old cases of eczema, in which the skin becomes greatly infiltrated, the twofold action of the ointment of mercuric oleate is often attended with the most happy effect. It is a most acceptable and at the same time beneficial agent in obstinate ulcers and indolent papules, tubercles, and in infiltration that often is attendant upon or follows abscesses, inflammation of the hair-follicles of the beard, and serofuloderma. It can be used with success in excess and deficiency of pigment that occur either as a disease, from applications, or from an effect of disease. It is a most useful remedy in both the animal and vegetable parasitic affections. In animal parasitic diseases, especially in phthiasis or lousiness, the ointment of mercuric oleate has alike the effect of destroying both the parasite and nits, which are not always reached by other mercurial preparations. In all varieties of vegetable parasites, the ointment of mercuric oleate is not only effective on the surface, but possesses the power of penetrating into the hairs, the follicles, and sebaceous glands, and thus killing the fungus that has passed into these parts.

The advantages of the mercuric oleate over the old mercuric ointments for its topical use are these: 1. Its chemical combination makes it better absorbed, gives greater penetrating action, and thus manifests itself in more prompt remedial

effect. 2. It possesses the advantage of obviating rancidity, which will occur with ointment of other mercurial combinations. 3. It is both economical and cleanly.

In concluding the description of the ointment of mercuric oleate, I wish to call attention to the fact that, while this oleate is more rapidly absorbed, yet it is slow, for the reasons already mentioned under the physiological action, to give rise to systemic effect. Large quantities can be applied over the general surface, either in children or adults, with great impunity; its toxic or constitutional effect seldom following in the majority of cases in which it is used.

Mercurous Oleate.—The ointment of mercurous oleate is very much stronger in mercury than that of mercuric oleate. In the ratio of 41.6 to 26.2, or about $1\frac{1}{2}$ times as strong, it has marked stimulating action, bordering on congestion, in the integument, and has decided resolvent and alterative effects. It is, therefore, applicable to the same class of affections in which the ointment of mercuric oleate is used, particularly if it is desirable to make a more marked impression upon the parts.

Having had repeated failures with the ointment of mercuric oleate in the inunction treatment of syphilis, I applied to Dr. Wolff, the chemist, for a stronger preparation, which has resulted in the development of the ointment of mercurous oleate.

In the inunction treatment of syphilis, this oleate is far superior to either the ordinary blue ointment or the form that has just been considered. It is a most powerful agent; should be applied cautiously, as it possesses deep penetrating power, and its quick diffusion will often bring about rapid constitutional effects. Its advantages over the ordinary blue ointment are its cheapness and the cleanly manner of application. A piece about the size of a bean can be gently rubbed in the axillæ as well as the same quantity on each limb on each side of the trunk. It will be quickly absorbed, may leave a reddened surface, but will neither stain nor discolor the linen or occasion the annoyance that follows the old inunction treatment of syphilis. An eczematous condition that is often feared, and that has been recently referred to as an objection to the inunction treatment of syphilis, by Dr. John Ashhurst, in his paper on the treatment of syphilis, read before the Philadelphia County Medical Society, can be always avoided by having the patient use vapor and and hot-air baths every second or third day. I regard the constant use of these baths now as all essential, after some years' experience in the inunction treatment of syphilis. The constant application of the ointment of mercurous oleate for a short length of time, or any fatty substance, to the skin, will attract dust and dirt to the parts: the glands and follicles will become distended, both with the substance applied and the foreign material, and the parts must be opened up very often by baths; otherwise, any form of mercury combination suspended in a fatty vehicle would naturally fail to pass in, and would, consequently, set up an inflammation on the surface.

The ointment of mercurous oleate is a most effective application in old spots of psoriasis, and in chronic palmar and plantar eczema, in which the integument becomes thickened, harsh, dry, and cracked. In such lesions, the oleate can either be used alone, but often it can be advantageously combined with some form of tar or naphthol.

Morphine oleate has, like all the alkaloid oleates, a feeble action, and that only upon the part to which it is applied. It can be employed in all irritable conditions of the integument, but many other stronger sedatives are usually preferable.

Nickel oleate, mixed with a fatty base, in the proportion of from one to sixty grains to the ounce, has a most decided astringent action, almost bordering upon the effect of a caustic on abraded surfaces. The ointment of nickel oleate of a weak strength, from five to twenty grains to the ounce of lard, acts at times

very well in epithelial ulcerations. It is often very effective in exuberant granulations, and in old callous ulcers. In some chronic cases of eczema, especially of the extremities, in which the skin is deeply infiltrated, hard, and of a leathery state, the ointment of nickel oleate, applied in the proportion already named, will often be attended with good results.

Quinine Oleate, both from the physiological experiments which have already been enumerated, and from repeated clinical experience, has proved in my hands of little, if any, service. Several cases have been reported in the medical journals in which the use of quinine oleate has been extolled as an invaluable remedy to use for intermittent fever, in debility, and, in fact, in all cases in which quinine is indicated and not well borne by the alimentary canal. In my service in the Philadelphia Hospital for Skin Diseases, and in private practice, I have used large quantities of quinine oleate from all the prominent manufacturers, and have yet to see a single case that has had any decided constitutional effect from its topical application. I have employed it in large quantities repeatedly in intermittent fever, both in children and adults, the paroxysm always returning unless arrested by some other means.

Silver Oleate, applied in its natural form to the abraded skin or sores, combines with the albumen and fibrin of the parts which it coats over, and thus protects from the air. It likewise causes powerful contraction of the blood-vessels, condenses, and superficially destroys the tissue. Silver oleate sprinkled over ulcers, bed-sores, and exuberant granulations, will set up a healthier action of the surface. Silver oleate previously dissolved with an equal amount of oleic acid, and then mixed with lard, in the proportion of from five to sixty grains to the ounce, forms a dark brown, soft, and pliable ointment. The ointment of this oleate is a safe and efficacious remedy, applied over the inflamed surface of erysipelas, or around the margins, to prevent the inflammation from spreading. In superficial lupus, kept constantly applied to the parts, it lessens the cell-infiltration, and thus reduces the active inflammation. In boils and carbuncles it is serviceable, and often arrests pustulation in its early stage. Eczema that occurs around the mucous outlets, especially the anus and genitalia, which is attended with an intolerable itching, will often be quickly relieved by applying the ointment of silver oleate, either alone or combined with opium, belladonna, or hyoscyamus. The deep penetration, the stability, and prompt action of the ointment of silver oleate, together with its comparatively painless and mild effect on the parts to which it is used, are its advantages over the ordinary silver ointment.

Tin Oleate, mixed with lard or a fatty base, in the proportion of from ten to sixty grains of the former to one ounce of the latter, forms a grayish-brown ointment, which is possessed of astringent and nutritive action upon the parts to which it is applied. It is of value and service in papular and fissured eczema. The ointment of tin oleate is of the greatest utility in diseases of the nails that are abnormal or deficient in growth. It assists in such cases in overcoming brittle, split, and soft conditions of the nails that result from injury to the parts, or that follow certain affections of the skin. The ointment of tin oleate, especially when combined with a little carmine, forms an elegant article of toilet for the nails and surrounding parts, giving them a beautiful lustre. Awnails, or the ragged and attenuated skin of the base of the nails, that are so frequently observed from neglecting these appendages, are often relieved or checked by the astringent action of the ointment of tin oleate.

Zinc Oleate occurs as a fine pearl-colored powder, with a soft soapy feel, and very much like powdered French chalk. It has both an astringent and stimulating action. In hyperidrosis and osmidrosis, or excessive sweating, fetid or otherwise, it is one of the very best remedies for topical use. It is especially applicable to those who suffer from an increased flow of sweat around

the axillæ, genitalia, and palmar and plantar surfaces. It is to the latter unfortunate and distressing class of cases, in which the epidermis often macerates, leaving a tender and exposed skin, attended with a disagreeable odor, that it can be used for relief, and at times with permanent good results. Dr. William Murrell, in the *London Medical Record*, November 15, 1883, also calls attention to the value of the zinc oleate in local sweating. He reports that zinc oleate, mixed with thymol (1 in 500), and used as a dusting-powder, forms an excellent application in many varieties of local sweating. He also states that he has used it with much success in the night-sweating of phthisis.

In acute vesicular eczema, in which the parts become covered with small vesicles, swollen, hot, inflamed, or raw, weeping, and attended with intense itching, the combined protecting astringent and stimulating action of the zinc oleate will usually cause all the inflammatory symptoms to abate, the discharge to dry up, and the swollen skin to resume its normal condition. Dr. McCall Anderson has referred to its utility in eczema, especially of the nares, in an article published in the *Journal of Cutaneous and Venereal Diseases*. The great advantage and value of the zinc oleate, among the same class of cutaneous affections, has been referred to by Dr. James Sawyer, in the *British Medical Journal*, February 10, 1883, and, one year later, in the *Birmingham Medical Review*.

Dr. Sawyer, in speaking of this and other oleates that can be used in the same form, remarks that "they can be employed in those troublesome, acute, discharging affections of the skin in which greasy preparations of any kind cannot be borne." Zinc oleate will cling to the skin, and will not fall or brush off like ordinary dusting-powder, and is, therefore, of very great value in seborrhœa oleosa. It forms a most excellent and useful toilet-powder for ladies who are troubled with shining faces or seborrhœa oleosa by dusting over the parts, either alone or mixed with an equal quantity of arrowroot, bismuth subnitrate, or lead carbonate, and scented with oils of verbena and roses. Zinc oleate likewise acts in a most efficacious manner dusted on an inflamed surface, that is hot and tumid, in cases of erythema about the groin and axillæ, and is also beneficial in herpes and herpes zoster. One part of the powdered zinc oleate, melted with four parts of a fatty vehicle, yields the ointment, which can be used in the same class of affections just enumerated, and in acne, rosacea, and in subacute and chronic forms of eczema.

I have now described in detail the special effect of each individual oleate, and the deductions have been drawn from a personal and most careful observation during the past eight years in the laboratories of the chemist and physiologist, and from my private practice and extensive clinical service. Large numbers of practitioners who have used the oleates in the manner in which they should be employed have reported the most favorable and practical results from them. Some few have been unfortunate enough to apply impure or improperly prepared oleates, and the results in such cases have generally been either negative, or irritating and injurious to the parts. A very few, unfortunately careless and injudicious observers, sceptics in therapeutics, who only believe in the older and more tried remedies, have taken up the oleates for fashion or popularity's sake; and, after but a very limited experience in their application, endeavor to condemn them with faint praise. The very few communications that have appeared from those that speak of their action disparagingly, and of their effect as problematical, are devoid of research (which would appear when they speak of quinine oleate being limited to inunctions for its systemic impression), showing an absence of practical experience with them, and of proper deductions from their results.

In concluding my remarks upon this subject, I would sum up by stating that, although the oleates have not been found to fill the place they were originally intended for by those who had introduced them to us, they have made

for themselves a most prominent place amongst the more scientific means we possess for treating affections of the cutaneous covering. They have opened up a new era for therapeutics in that branch of medicine, and occupy a position that has not been held by either ointment or lotion, and which they will occupy not only in a transitory manner, but permanently, and in an increased ratio, as their nature, use, and effect becomes more thoroughly understood and known.

Dr. MACLAGAN (President of the Section) said he was sure he expressed the feelings of every one there present when he said that they were greatly indebted to the older American men who had sent the younger ones, like Dr. Shoemaker, to the meeting, and he hoped the younger ones would continue to follow the example which had been set. All remembered Dr. Gross, who had come over to the meetings of the Association, and never went away without the wish, on their part, that he would often return. The oftener Dr. Shoemaker came, the more hearty a welcome he would receive. Regarding the paper which Dr. Shoemaker had read, very little was known of the oleates, except what Dr. Shoemaker had stated, and he had given, in the most clear style, a valuable amount of information. All knew the difficulties of treating skin diseases. There was no class of ailments so altogether unsatisfactory in their results; but, in the more chronic forms, there were cases in which it would not be impossible to follow the example of Dr. Shoemaker, and his oleates would certainly be used more in the future than in the past. If no other results could be expected, save that which was obtained in ringworm, without the process of epilation, that alone would be a result worthy of the trial.

Dr. CULLIMORE (London) said that he had at one time suffered from a skin affection for two years, and he regretted that he was not, at the time, aware of the efficacy of the oleates, or he would not have suffered so long. He referred to "barber's itch," a most difficult thing to eradicate. He had tried many remedies without effect, including the old oleate of mercury, which failed to produce a desirable result, but, on the contrary, caused much irritation. The objection to it was that it was too irritating, and, if Dr. Shoemaker's oleates would cure without that irritation, they would prove a very great boon indeed. The ointments certainly should not be made up with petroleum products, as, in that case, they would be greatly inferior to those made up with lard. He had his ointments made up with lard, and they were, in that form, very much more effective than they otherwise would have been if made with vaseline. On that point, as far as his experience went, he could fully bear out Dr. Shoemaker's assertions.

Dr. FINNY (Dublin) said that his experience of the oleates was confined to those of mercury and zinc. He had used the latter in powder as well as in the thicker form. He wished to bear his own personal testimony to the advantage to be derived from the use of oleate of mercury in skin diseases. It could be used fearlessly as far as the question of salivation was concerned. He had tried it with negative results; and, in the cases of young children under two years of age, had used the 5 per cent. solution, and sometimes the 10 per cent., and had never seen the least sign of salivation. This was an important fact, because one was nervous of the results in such cases. Ringworm of the scalp was better treated by it than by any other remedy. In all treatment of skin diseases, there was nothing so necessary as steady persistence in one line of treatment. In eczema, especially of the indurated variety, he had used the mercury oleates; but oleate of zinc, used in the form of an ointment, one or two drachms to the ounce, would act as a very useful means.

Dr. WALTER SMITH (Dublin) said he would ask one or two questions. Dr. Shoemaker, very rightly he thought, laid great stress on the importance of obtaining pure oleic acid; and there could be no doubt about the injury which

arose from the use of rancid fats; but it was only right to mention that an authority in the United States—Dr. Squibb—had come to the conclusion that an excellent first-class oleic acid could be obtained from the common fat and oil of the candlemaker, without resorting to the more expensive process mentioned in the paper. Dr. Shoemaker referred to the difference between vegetable and animal fats, and the relation was certainly worthy of mention in reference to their internal uses. Vegetable fats were more susceptible of oxidation, but in the course of time were more irritating to the skin. It had been found impossible to get a vegetable fat as a substitute for cod-liver oil. There were two ways of getting oleates: one was by direct synthesis, and the other by double decomposition. It was upon the latter method that Dr. Shoemaker entirely depended for the preparation of his oleates; and he (Dr. Smith) thought it could hardly be questioned, looking at his preparation, that the result could not be surpassed by any other method of manufacture. One observation passed from Dr. Shoemaker which he did not know whether he (Dr. Smith) had understood correctly. Referring to the oleate of aconitia, Dr. Shoemaker said it was only an oleic solution—not a true oleate—and that it was almost devoid of physiological action. He did not understand how it was allowable to speak of the suspension of a base in an acid, and he would like to know how the combination could possibly be avoided. The uses of the oleates enumerated were many, but they might all be referred to two headings, which would give a simple reason for in one case using this, and in another case another basis. Dr. Shoemaker disclaimed the use of vaseline. One object was for purely preventive purposes, and the other was for penetrative purposes. No one that he knew of had ever contended that vaseline was absorbed. There was no experimental evidence, and he himself did not believe that it was absorbed. It was not a fat in any sense of the word. Though commonly called a fat it was not a fat. Fats were readily absorbable by the skin. If they wanted merely surface-protection, he thought they might quite allowably use vaseline. They did not want it to penetrate. On the contrary, if they wanted it to penetrate they should use fats, and substances soluble in fats, and this led to the question of the nonsolubility of the oleates. It was a singular thing that the oleates of mercury should follow a different law from other well-known mercurial preparations. The common blue butter in its use was often followed by serious, if not fatal, results. It was a mixture of certain mercurial compounds with fats, and was capable of being absorbed. He did not see why oleate of mercury should not be absorbable under different conditions, and why it was incapable of absorption he was at a loss to understand. The effects of the oleates were of two kinds,—of a preventive and of a soothing nature, and those were the effects, as he understood it, chiefly claimed for them by Dr. Shoemaker, especially in the oleates of lead, bismuth, and zinc. With respect to antiparasitic virtue, they had been found to be of the greatest utility. He regretted that Dr. Shoemaker had referred to the compounds as containing so much “per cent.” The proper way to speak of them would be “so many parts of the oleate.”

Dr. WHITLA (Belfast) remarked that it had been said, in reference to the treatment of rheumatism, that, by the efficacy of salicylic acid, they could turn off and on the fever of acute rheumatism as they could the gas in a gas-tube. He thought that, from the introduction of the oleates by Dr. Shoemaker, they could not turn off or on acute affections of the skin in a like manner.

Dr. SHOEMAKER, in reply, said that his paper was a mere abstract, which endeavored to give briefly the practical parts of the subject with their practical application. One of the speakers had referred to mercury producing salivation. In reviewing the therapeutic action of the mercurous oleate, he (Dr. Shoemaker) said it was particularly valuable for the inunction-treatment of syphilis. Dr. Smith had said no one would deny that mercurial ointment would produce sali-

vation. Dr. Shoemaker did not deny that mercurial ointment would salivate patients. The physiological investigations which he had made on the oleates had resulted in knowledge which contradicted the statements of recent writers that the oleates, when applied to the skin, were rapidly carried into the system. That could not be maintained for one moment. He defied any one to apply the quinine or mercury oleate in the manner recommended, spreading it lightly over the skin, or for protective action, and produce constitutional effects from it. Of course, by a mechanical application of large quantities of the mercurous or mercuric oleate, systemic effect might be eventually produced. One speaker had stated that he had used the mercury oleate in the treatment of ringworm, and was unable to cure his patients by application to the surface. Dr. Shoemaker did not say that either one or other of the mercury oleates, without epilation, was the treatment for ringworm. What he did say was that the ointment of copper oleate, without epilation, had been the means which he himself generally employed. The deductions of the last speaker he must differ from in every respect. In relation to the alkaloid solutions, he had in his hand two preparations. By the double decomposition which took place between the solution of sodium oleate and the sulphate of zinc, they had an entirely different preparation from the other one, which was merely an alkaloidal one. The zinc oleate was a stable chemical oleate—in other words, a salt—while the so-called oleates of the alkaloids were generally only solutions, and would deposit, sooner or later, the alkaloid separating and crystallizing from the acid. He stated that these oleates, as they were formerly termed, were little better than acid solutions. To say that the alkaloidal substances alone were to give force to such preparations, was to set up a theory which was opposed to our present knowledge, that two bodies entering into a true chemical combination lose their identity in forming a third at variance with its constituents. With relation to Mr. Squibb's method of manufacture by candle-oil, and using impure oleic acid, he (Dr. Shoemaker) said that if they applied these to the integument, they could not expect the same effect as when they had them formed from a pure acid, bringing about a double decomposition and forming an entirely new preparation. Mr. Squibb could not produce from that acid, or from the red oil of candle-makers, such oleates as he (Dr. Shoemaker) could show them. Mr. Squibb was a chemist; he (Dr. Shoemaker) was a physician, and he had devoted ten years of his life to the study of this question. Mr. Squibb stated that, with the impure oleic acid, he could make preparations which would have the same effect; he (Dr. Shoemaker) said that was untrue when applied by the physician. With reference to vaseline and petroleum-products, he said that he believed, reasoning from the effects he had seen produced, that the animal fats had more affinity for animal tissues, and therefore he generally used lard for oleates, not for the purpose of their production, but for the purpose of producing their physiological effects. The petroleum products might protect, but they had no power of deep penetration in the glands and follicles; while petroleum-products might protect, they might also irritate the surface, and this he had often noticed. The oleates, on the other hand, by protecting and penetrating into the glands and follicles, were better combined with a non-irritating, fatty substance that had affinity for animal tissues, lard being, without doubt, the best. The argument used in reference to the true real chemical compounds would also apply to the point raised in reference to the vegetable origin of oleic acid, and its consequent effect, by this way of reasoning, on the integument. As regarded his use of the term per cent., as objected to by one of the speakers, the oleates in all that had been written on the subject had been referred to as this or that per cent., and he, on that occasion, used the term because he thought they would be more familiar with it.

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